ZOOLOGY

Ichthyological Notes.[1] — *Fishes of Central America*: Mr. C. Tate Regan (in the Fauna Centrali- Americana, 1907) continues his account of the fishes of Central America, with good descriptions and a series of excellent figures.

He describes as new *Gerres simillimus*, the Pacific Coast representative of *Gerres* (or *Xystaema*) *cinereum*. He regards *Gerres axillaris* as distinct from *Gerres lineatus*. *Gerres embryx* and *Gerres brasilianus* are regarded as old examples of *Gerres plumieri*, a conclusion also reached by the present writer. He regards *Centropomus pedimacula* of Poey as identical with *Centropomus pectinatus*. The fish from the Pacific called *pedimacula* he identifies as *C. medius*. *C. mexicanus*, *C. gabbi*, and *C. heringi* are identified with *C. parallelus*. *C. argenteus* is the young of *C. undecimalis*. *C. viridis*, the Pacific representative of *C. undecimalis* is shown to be a distinct species. *C. affinis* and *C. scaber* are identical with *C. ensiferus* and *C. brevis* and *C. atridorsalis* with *C. armatus*. *C. altus*, a new species from Colon, is described as the Atlantic representative of *C. unionensis*. *Syngnathus spicifer*, a species from Zanzibar and the Philippines is recorded from Tehuantepec. *Doryichthys brachyurus*, a South Sea species, is recorded from Tehuantepec. *Siphostoma brevicaudum* from Vera Cruz, is regarded as identical with *Doryichthys lineatus*. *Chirostoma attenuatum* and *Ch. zirahuen* are regarded as identical with *Ch. bartoni*, and *Ch. mazquital* with *Ch. jordani*. *Chirostoma labarcae* is considered identical with *Ch. breve*, *Ch. crystallinum* with *Ch. lucius*, and *Ch. lermae* with *Ch. sphyraena*. The genus Melaniris is said to be founded on discolored specimens of Thyrina, and the species *evermanni*, *crystallina* and *balsanus* are all referred to the synonymy of *Thyrina guatemalensis*. Xenatherina, a new genus, is based on *Menidia lisa*. *Neomugil digneti* is identical with *Agonostomus nasutus*. *Joturus stipes* and *Agonostomus globiceps* are identical with *Joturus pichardi*. *Mugil gaimardianus* and *Mugil setosus* are regarded as the young of *Mugil curema*. This view may be correct, but a study of specimens in the markets of Cuba gave me a contrary impression. The well defined and thoroughly tenable genera Encinostomus and Tylosurus are not adopted by Mr. Regan, a view for which no reasons are assigned.

[1] Owing to unavoidable circumstances the proof of these notes has not been revised by President Jordan.

Fundulus guatemalensis and *F. oaxacae* are identified with *F. punctatus*. Cynodonichthys is identified with Rivulus. *Cyprinodon latifasciatus* is identified with *C. boveinus*, and *C. elegans* and *C. eximius* are placed in the same synonymy. *C. californiensis* and *C. nevadensis* are identical with *C. macularius*. *Zoogenaticus miniatus* is regarded as identical with *Z. diazi* and *Z. maculatus* with *Z. robustus*. The species *dugesi* and *quitzoensis* are referred to Zoogoneticus, while *pachycephalus* and *punctatus* are removed from their provisional station in Actinia. Limnurgus is unwarrantably used instead of the much older, but unpleasant name of Girardinichthys, and *Characodon geddesi* is placed in the synonymy of *G. innominatus*. Chapalichthys is regarded as inseparable from Characodon.

Characodon ferrugineus and *eiseni* are identical with *Ch. variatus*. *Ch. garmani* is the same as *Ch. latevalis*. Skiffia is made a synonym of Goodea. *Charaeodon duitpoldi* and *Xenendum xaliscone* are referred to the synonymy of *Goodea atripinnis*. *Skiffia variegata* is the same as *Goodea lermae*. Pseudoxiphophorus is regarded as a subgenus of Gambusia. *Gambusia affinis* with its synonyms is called by the older name of *Gambusia gracilis*. *Pseudoxiphophorus pauciradiatus* is the same as *Gambusia jonesi*, and *Ps. retiaulatus* is *Gambusia bimaculata*. *Poecilia presidionis* is placed in Girardinus, which name is used instead of the prior Heteraudria which may be ineligible because no known species were assigned to it. *Heteraudria occidentalis* is placed in Poecilia. *Poecilia sphenops* is made to include *mexicana, thermalis, gillii, chisoyensis, dovii, vandepolli, arubensis, boucardi, butleri, limantoun, nelsoni* and *latipunctata*. *Platypoecilus variegatus* is referred to *Poecilia maculata*; *Mollienesia formora* is referred to *M. latipinna*; *Xiphophinus jalapae* is referred to *X. helleri*. A number of additional South American cat-fishes are recorded from Panama. *Aelunchthys nuchalis* is regarded as identical with *A. panamensis*, and *Ae.* (or *Felichthys*) *scutatus* from Panama and *Ae. isthmensis* from Colon are described as new.

Netuma vacula is referred to the synonymy of *Galeichthys planiceps*, and *Netuma clattena* to that of *G. Kessleri*; *G. azureus* to that of *G. guatemalensis*, and *G. xenauchen* to that of *G. lentiginosus*. *Galeichthys seemani* is made to include *G. jordani, G. gilberti* and *G. eigenmanni*; *G. guentheri* is described as new, from the Gulf of Mexico.

The name Anus is used in place of the uncertain Tachysurus, probably with justice. *Galeichthys aquaedulce* is referred to *Anus melanopus, Tachysurus Steindachneri* to *Anus fuerthi, Tachysurus emmelane* to *Anus multeradiatus* and *Cathorops gulorus* to *Anus hypophthalmus*.

The same fauna is again treated by Dr. Seth E. Meek (Publ. Field Columbian Museum) in a Synopsis of the Fishes of the Great Lakes of Nicaragua. *Rhamdia barbata* is described as new from San Francisco de Nicaragua, and *Astyanax nasutus* from Managua. *Tetragonopterus humitis* is the young of *Astyanax aeneus*. *Bramocharax elongatus* is described from Lake Managua, and *Dorosome chavesi* from several localities. *Poecilia dovii* is the same as *P. sphenops*. *Melaniris sardina* is described from Lake Managua, and *Pomadasis grandis* from Lake Nicaragua. Erythrichthus is a new sub-genus based on *Heros citrinellus*. This name should be criticised as badly formed, while the name properly spelled (Erythrichthys) is already used for a genus of fishes. Dr. Meek gives an interesting account of the phenomenon of rubrism — the prevalence of red colors in part of the individuals of these fishes. *Cichlasoma granadense* is a new species from various lakes. *Cichlasoma dorsatum* is another from Lake Managua and *C. nigritum* from Lake Nicaragua. *Heros basilaris* is the same as *C. citrinellus*, the type of Erythrichthus.

Fishes of California: In the University of California publications (Marine Laboratory of San Diego) Edwin C. Starks and Earl L. Morris of Stanford University give a list of the Marine Fishes of Southern California. In this well considered list, the range of numerous northern species is extended to the south of Point Concepcion. The single new species is a flounder, *Pleuronichthys ritteri*.

Fishes of South America: In the Proceedings of the Washington Academy of Sciences (VIII, 1907) Dr. Carl H. Eigenmann gives notes on a Collection of Fishes from Buenos Aires. The fauna is essentially that of the Amazon, although the region is not tropical. New species are *Plecostomus laplatae, Pomolobus melanostomus, Geophagus australis* and *Batrachops scotti*. The use of the family name Stolephoridae is unexplained. The type of Stolephorus is identical with that of Spratelloides and the genus belongs to the Dussumieriinae.

In the Annals and Magazine of Natural History (XIX, 1907) Mr. C. Tate Regan describes *Pimelodus boucardi* from Yucatan; *P. brachycephalus* from Guatemala; *P. rogersi* from Costa Rica; *Gambusia annectens* from Costa Rica; *G. terrabensis* from Costa Rica, and *Sicydium pittieri* from Costa Rica. *Mollienesia jonesi* (= *Pseudoxiphophorus pauciradiatus*) is identified as *Gambusia jonesi*.

In the Proc. U. S. Nat. Mus. (XXXII, 1907) Dr. Eigenmann discusses the poecilioid fishes of the La Plata Basin. New genera are

Acanthophacelus (*reticulatus*), Ilyodon (*Ilyodon paraguensis*, new species), Phalloptychus (*januarius*) and Phalloceros (*caudomaculatus*). Jenynsia is not distinct from Fitzroya.

In Archivos do Museo Nacional (Rio de Janeiro, 1907) Dr. Alipio de Miranda Ribeiro begins an elaborate account of the fishes of Brazil. The first part is devoted to morphology and physiology. The work is well done, well printed, and with good illustrative plates.

In the Ann. Mag. Nat. Hist. (XIX, 1907) Dr. G. A. Boulenger discusses the variations of *Stercolepis gigas*, "a great sea-perch from California and Japan." He maintains that the two essential points of distinction, the higher spines and the larger scales in the Japanese form, *Stereolepis ischinagi*, as compared with the Californian *S. gigas*, are both fallacious. The spines are much higher in the young fishes, and the scale count is deceptive.

I am still of the opinion that the two are distinct. The smallest specimen of Stereolepis known from Japan or California was taken by me at Santa Barbara in 1880. This has much higher spines than the adult, but the spines are still lower than in *S. ischinagi* of much larger size. In my way of counting the scales are smaller. Moreover, the young of the Japanese species have broad lengthwise stripes of black, while the American form is irregularly blotched. A study of many specimens of different ages is necessary before the question can be finally settled.

Fishes of Bermuda: In the Bulletin of the Museum of Comparative Zoology, Thomas Barbour gives notes on Bermudian Fishes, with numerous additions to the list. *Siphostoma dendriticum*, a pipe fish covered with filamentous appendages, is described from Ireland Island. *Callionymus bermudanum* is dredged off Castle and Ireland Islands. *Antennarius stellifer* is described from Castle Harbor; *Teuthis helioides*, a species of bright yellow color, is from Castle Sound, and *Holocentrus puncticulatus* from Flate's Inlet.

Fishes of the South Seas: In the Report of the Bernice Pauahi Bishop Museum of Honolulu (IV, 1906), Mr. Alvin Seele records the fishes obtained in his extensive collections in the South Seas, from the Marquesas to the Solomon Islands. The new species, 33 in number, are represented rather unsatisfactorily by photographs.

In the same report (vol. II) is a paper by William A. Bryan describing three new species of fishes from Honolulu. One of these, *Zanclus*

ruthiae is distinct from *Zanclus cornutus*. It is, however, identical with the original *Zanclus canescens* recently newly described by Mr. Regan. The other species are *Pseudoscarus heliotropinus* and *Pseudoscarus vitriolinus*. Some of the parrot-fishes previously known from Hawaii are here again described.

In Bull. Dept. Agric., Indes Neerl. (VIII, 1907) Dr. P. N. Van Kampen describes East Indian mackerels, *Scomber kanagurta*, which he identifies with *S. loo*, *S. neglectus* and *S. brachysomus*.

In the same bulletin, Dr. Van Kampen describes a new shark, *Galeocerdo fasciatus*, from the East Indies.

In the Sitzungsberichte of the Gesellschaft Naturforschender Freunde Dr. Erich Philippi notes that the cyprinodont Glaridichthys is really physoclistous, not physostomus as is supposed to be the case throughout that family. He notes also that this viviparous genus does not have a modified anal fin in the male as has been supposed, a fact already noted by Dr. Meek. The other articles are notes on the genera Glaridichthys and Cnesterodon.

In the American Journal of Anatomy, 1907, Dr. Charles R. Stockard notes the embryonic history of the crystalline lens of the California hagfish *Eptatretus stouti*, which Mr. Stockard calls by the much later name of Bdellostoma.

In the National Geographical Magazine for June, 1907, Dr. Hugh M. Smith has an article on "Our Fish Immigrants" and Dr. Gill discusses Fish that Build Nests, with a series of interesting plates.

In the Pacific Fishermen for September, 1907, Mr. Henry S. McGowan discusses the destruction of young salmon by trout. and gives photographs of stomach contents which show that in all probability the trout in the northwestern streams kill as many salmon as the fishermen, taking them when very young.

Jordan and Evermann have already shown the enormous destruction of young salmon wrought by the Dolly Varden trout (*Salvelinus malma*) in Alaska. These photographs show that the steelhead and cut throat trout are also great offenders in this regard.

Fishes of Japan: In the Proc. U. S. Nat. Mus. (XXX, 1907) Jordan gives a review of the Japanese species of Histiopteridae or boar-fish. New genera are Evistias (*acutirostris*), Zanclistius (*elevatus*), Quinquarius (*japonicus*) vice Pentaceros preoccupied, Gilchristia

(*richardsoni*) and Quadrarius (*decacanthus*). The name Velifracta is substituted for Tephritis, a genus of flounders, the latter name being preoccupied. In the same proceedings, Jordan gives a review of the Japanese Gerridae, and Jordan and Starks a list of the fishes of the Riu Kiu or Lu Chu Islands, called Okinawa in Japan. One new species, *Girella mezina*, is described. The genus Hierichthys is identical with Congrogadus.

Fishes of Siberia: In the Proc. U. S. Nat. Mus. (XXXII, 1907), Dr. Leo Berg of St. Petersburg discusses the cobitoids and the sticklebacks of the Amur region. He regards the Asiatic loach, *Misgurnus anguillicaudatus*, as a color variation of the European *Misgurnus fossilis*, the former being irregularly spotted, the latter with longitudinal stripes. He further regards all the Asiatic specimens, *Ussuria leptocephala* Nikolsky, *Misgurnus decemcirrosus* Basilewaky etc. as variants under *M. anguillicaudatus*.

Octonema (preoccupied) and Lefua (Herzenstein 1888) are older names for the genus called Elxis by Jordan and Fowler, 1903. The Japanese species is *Lefua nikkonis*. *Elxis coreanus*, *Nemacheilus dixoni* and *Octonema pleskei* are regarded as synonyms of the Mongolian species *Lefua costata*. *Orthrias oreas* from Hokkaido, Berg regards as identical with *Nemacheilus toni* from the Amur, and he thinks it is not generically and scarcely specifically different from the European *N. barbatulus*. Like Jordan and Fowler, Berg finds the common loach, *Cobitis taenia*, identical in Europe, Siberia and Japan.

The Japanese stickleback, *Pygosteus undecimalis*, is identical with *P. tymensis* (Nikolsky 1889) from Sakhalin; *Pygosteus seindachneri* and *P. bussii*, are as the present writer has already indicated, identical with *Pygosteus sinensis* from China.

Mosquito-eating fishes: In the Bulletin of the Hawaii Exp. Station, (20, 1907) Mr. D. L. Van Dine gives a valuable account of the successful introduction of Texas top-minnows, as natural enemies of mosquitoes. This was done at the instance of the present reviewer. The work was successfully accomplished by Mr. Alvin Seale under the auspices of the Honolulu Board of Health and of the Territory of Hawaii. The species secured were *Gambusia gracilis*, *Fundulus grandis* and *Mollienesia latipinna* from Galveston, Texas. 450 fishes were taken, 27 being lost on the way. All the species thrive in the new locality and all are eager in the destruction of mosquitoes, the little Gambusia perhaps most so.

Fishes of South Africa: Dr. J. D. F. Gilchrist (Marine Investigations in South Africa, 1907) describes 15 new species of fishes, some of them of special interest. Dr. Jacques Pellegrin (Assoc. Française Avanc. Sci., 1906) notes the presence of a genus of Asiatic family of Nandidae (Polycentropsis) in Africa (Rio Niger).

Fishes of New Guinea: In Resultät. Exp. Sci. Neérl. à la nouvelle Guinée (Leiden, 1907) Dr. Max Weber describes the fresh water fishes of New Guinea with many new species. This is an excellent paper, well illustrated.

Fishes of the Antarctic: In the Expedition Antarctique Française (Paris, 1907) Dr. Léon Vaillant describes the fishes, with several new species. A genus, Artedidraco, commemorates the 200th anniversary of the birthday of the "Father of Ichthyology," Petrus Artedi.

In Illustrations of the Zoology of the *Investigator* (Calcutta, 1905), Alcock and MacGilchrist figure deep sea crustaceans and fishes already described.

In the Sitzungsberichte of the Academy of Vienna (1907, XXVIII), Dr. Steindachner describes a number of fishes from Jurua, Brazil, and in two other papers, other species from streams of southern Brazil, the greatest number being from Rio Cubatao.

Dr. Louis Dollo (Proc. Royal Soc. Edinburgh, XXVII, 1907) notes the rediscovery of a singular pelagic fish, *Prymnothonus hookeri*, which he regards as an ally of Paralepis.

Mr. J. Douglas Ogilby in the Annual Report of the Amateur Fishermen's Association of Queensland (Brisbane 1907) gives a list of the species of fishes in the collection, with new generic names, undefined, but with indicated types as follows: Batrachomoeus (*coecus* DeVis) "the Greater Frog-fish," Brachaelurus (*colclloughi*, new species) the "Blue Gray Blind-shark," Coryzichthys (*diemensis* Le Sueur) the "Banded Frog-fish." These were described in a paper read March 23, 1907, but the accounts have not yet appeared. A number of new species to be described are also indicated, the types being in this collection.

In the Records of the Canterbury Museum (1907, I) Mr. Edgar R. Waite gives a list of the fishes of New Zealand, 252 species are recorded. This figure shows how far from complete is our knowledge of New Zealand fishes. It is safe to say that a thorough survey of these waters

such as Mr. Waite contemplates will yield double this number of shore-fishes, although the isolation of New Zealand is doubtless a reason why the fauna is relatively scanty as compared, for example, with that of Japan. The shore-fishes of New Zealand are for the most part distinct from those of Australia.

The writer has lately received through the courtesy of Mr. J. H. Tole of Auckland, a little known volume, Handbook of the Fishes of New Zealand, published by R. A. Sherrin, at Auckland in 1886. This book is largely a compilation, but an intelligent one.

In Zool. Anzeiger (XXVIII, 1905), Professor Robert Collett describes a number of fishes from the Azores, one of them, *Lampadena chavesi*, being new.

Dr. F. Guitel of Rennes publishes (Archiv. Zool. Exper. 1904) comparative descriptions of species of Lepadogaster the beginning of a general anatomical and systematic study of the Gobiesocidæ, in which he asks the cooperation of naturalists.

In the Smithsonian Miscellaneous Collections (1907) Dr. Theodore Gill gives an elaborate account of "Noteworthy Extra-European Cyprinids," a comparative study of dace, minnows, roach, horny-heads and shiners of America and Asia.

In another paper Dr. Gill gives an outline of the strange life-history of toad-fishes, weevers and stargazers, with plates.

Classification of Fishes: In Ann. N. Y. Acad. Science (XVII, XXIX, XXX, 1907) Dr. William K. Gregory of Columbia discusses the orders of teleostomous fishes. This is a peculiarly wise and temperate discussion of one of the most difficult of problems, the arrangement of the bony-fishes in tangible, definable and natural groups. Dr. Gregory recognizes that "degrees of blood relationship do not exactly correspond to degrees of homological structural resemblances and differences nor to the divisions of classification." He also recognizes that distinctness in groups is often dependent on the extinction of intermediate forms. He discusses in excellent fashion the strength and defects of the "English and American schemes of Classification," and shows that these are in fact nearer to each other than they appear. "The idea underlying the American method is that the best way to map out the topography of this varied morphological expanse is to assign a name to every conspicuous cluster of elevations, even if some lower elevations may connect with neighboring

systems." On the whole Gregory inclines to the American system and approves of "Gill's principle of keeping groups apart until they are shown to belong together." No linear series and no grouping of these fishes into orders and suborders can ever be satisfactory to anyone, for the forms in question exhibit a great variety of interrelations and divergences. The classification of Dr. Gregory is however about as satisfactory as any one which is current, and it represents a great amount of careful investigation and comparison.

Ecology of Fishes: In the Journal of Geology (1907) Dr. John C. Branner discusses the coastwise streams about Monterey Bay, with reference to present distribution of the fish fauna. He shows that the latter is dependent on the former courses of these streams.

In the Bull. Bureau of Fisheries (XXVI for 1906) Prof. Chauncey Juday gives an elaborate study of the Twin Lakes in Colorado, with especial reference to the food of the trout, *Salmo stomias*.

In the Rept. of the Director of the New York Aquarium, Mr. Charles H. Townsend, discusses the cultivation of fishes in ponds.

Anatomy of Fishes: In the Biological Bulletin (XII, 1907) Dr. H. D. Senior discusses the conus arteriosus of two of the most primitive of bony fishes, *Tarpon atlanticus* and *Megalops cyprinoides*, with comparison with that of other related forms. In Albula, Tarpon, and Megalops there are two rows of valves. Ordinary bony fishes have but one, while in the ganoid fishes, there are three (Amiatus) or more. In Elops, Chanos, Hiodon, Osteoglossum, Notopterus and Mormyrops, but one row of valves has been found. In Dorosoma, there is a trace of a rudimentary second row. This strengthens the suggestion that the Megalopidae, (Megalops, Tarpon) should constitute a family distinct from Elops.

In the Proc. Wash. Acad. Sciences, 1907, Mr. W. F. Allen of Stanford University discusses very fully the distribution of the sub-cutaneous vessels of the head in the gar pike and paddle fish.

In the Budgett Memorial Volume (Cambridge, England), Dr. J. Graham Kew of the University of Glasglow, discusses with great completeness the embryology of the crossopterygian fish, *Polypterus senegalus*. In this paper, Dr. Kew upholds his theory as to the origin of the vertebrate limb from modified gills rather than from a lateral fold or from a gill septum.

In the Journal of Experimental Zoology (IV, 1907), Mr. Charles R. Stockard discusses the influence of external factors, chemical and physical on the development of the egg of the killifish (Fundulus).

Fossil Fishes: In the Bull. of Geology of the University of California, Dr. D. S. Jordan describes the fossil fishes known from the rocks of California, with supplemental notes on other extinct fishes. 43 species are known from California. *Acrodus wempliae, Heptranchias andersoni, Isusus smithii, Carcharodon arnoldi, C. riversi* and *C. branneri, Xenesthes velox, Etringus scintillans, Rogenio solitudinis* and *R. bowersi*, and *Merriamella doryssa* are described as new. Xenesthes, Etringus, Rogenio and Merriamella are new genera. Rogenio, a new genus, doubtfully referred to the Cobitopsidae, shows a remarkable resemblance to the New Zealand white bait, Retropinna, and is possibly a fossil smelt. Etringus is a curious form with enamelled ganoid scales, and the body of a herring. Merriamella seems to be an athenoid with a small spinous dorsal fin.

The genus Knightia (*K. eocaena*) from the Green River Eocene is characterized, and also a new species of sucker, *Chasmistes oregonus* (Starks) from Oregon. Teeth of fossil salmon from the Quaternary of Oregon show the extreme age of the anadromous habit of the salmon of the Columbia.

In the Memoirs of the New York State Museum (X, 1907), Dr. Charles R. Eastman presents an elaborate monograph of the Devonic fishes of the New York formations, with a series of excellent plates. Interesting discussions of the relationship of Bothriolepis and other ostracophores is given, the author regarding these forms as a distinct class, but not accepting the recent bold speculations of Dr. William Patten, who compares these forms with Limulus and other spider-like crustaceans.

Mr. George P. Merrill publishes a catalogue of the fossils, minerals and ores in the United States National Museum (1907). This catalogue furnishes a useful list of the fossil fishes. All the California species above noted — even the abundant sharks' teeth — seem to be wanting in the national collection.

In the Bulletin Mus. Comp. Zool. (vol. L, 1907) Dr. Eastman discusses the dentition of the mylostomid Arthrodires, giving further reasons for regarding the Arthrodires as specialized Dipnoans. A new species is described from the Cleveland Slate, as *Mylostoma newberryi*.

In the Bulletin Amer. Mus. Nat. Hist. (XXIII, 1907), Mr. L. Hussakof describes a fossil surgeon-fish from Antigua Island, West Indies, in rocks supposed to be of Eocene Age. The species, represented by a very complete skeleton is named *Zebrasoma deani*. This species is the first of the family of Hepatidae (Teuthidae) found in America, and it is the only fossil species of the genus Zebrasoma. The pertinence of the species to the living genus Zebrasoma may be questioned. The first dorsal spine is the longest and seems semi-detached. In Zebrasoma the first is much shorter than the others. The soft fins in Zebrasoma are very high. In Z. deani, they are quite low. The caudal peduncle is slenderer in *Z. deani* and the tail much more widely forked than in any species of Zebrasoma. The number of vertebra (8 + 11 = 19) is fewer than in living Hepatidae (22). The caudal spine possibly existed, but if so, it is lost in this specimen.

If the fish is to be referred to an existing genus, Callicanthus with a slender tail and a widely forked fin, with the first of the five dorsal spines enlarged and with the vertical fins low, is nearer to the species than is Zebrasoma. The profile in Callicanthus is curved while in *Z. deani*, it is very straight.

In the Bulletin de la Societé Belge de Geologie (XXI, 1907), Dr. Louis Dollo endeavors to show that the ptyctodont fishes, supposed to be fossil chimaeroids, really belong to the order of Arthrodires. He further concludes that the chimaeras are specialized cochliodonts, changed through the necessities of deep sea life and a food of mollusks. Dr. Dollo further adds that "the idea of the Irreversibility of Evolution which has led me to the conclusions I have just justified, has once more shown its utility, else one would be led to maintain that specialized organisms might become in the process of descent again primitive, in order to become again specialized in the same or in different direction."

DAVID STARR JORDAN.

Notes on the Structure of Insects.— *A Study of the Common House-Fly.*[1] — That one need not search far for profitable objects of research is evidenced by the mass of interesting material presented by Mr. C. H. Hewitt's studies of the common house-fly, *Musca domestica*. In the first of a series of three papers dealing with the anatomy, develop-

[1] Hewitt, C. G. The structure, development, and bionomics of the house-fly, *Musca domestica*. Part 1.— The anatomy of the fly. *Quar. Journ. Micr. Sci.*, 1907, li, pp. 395–448, pls. 22–26.